ORIGINAL ARTICLE

COMPLEMENTING THEORY WITH PRACTICE TO ENHANCE STUDENTS' LEARNING

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Background: Combining cognitive skills teaching related to the techniques leads to better understanding in a skill training course; but still there a substantial disagreement in curriculum on such combinations. This study aims to help guide the designers in making the outline of instructional plan for a Clinical Skills Module (CSM) for the undergraduates. Objectives were to assess performance of students on a clinical skill after training by two different models of (hands-on only or with cognitive skills) instructions and explore their perception on the employment of educational strategies through Focus Group Discussions (FGD) through a Sequential mixed method study design: (1) Quantitative (Pre- and post-assessments and comparing their results (2) Qualitative (Exploration of perspectives through constructivist approach using qualitative phenomenological design) The study was conducted during the month of September, 2015 at Rabigh Medical College, King Abdul Aziz University, Jeddah. **Methods:** Students entering fourth year were randomized to two groups to participate in pre-post OSCE using global rating scale and their scores were compared. The examiners were kept blinded to the randomization of students undergoing two separate training methods. The test group (group A) was trained for both procedural as well as cognitive skills whereas the control group (Group-B) was trained only with hands-on practice. Later their perception about the addition of cognitive skills to improve of procedural skills was explored through focus group discussions. The recorded audio tapes of FGDs were transcribed and analysed thematically. Triangulation of themes and trends was achieved by relating the content analysis to the relevant frequency of quotes. Auditing of the data verification was done by all the authors separately. **Results:** A total of 42 students completed both pre- and post-tests. As a result, student performance in OSCE significantly increased from pre- to post-test (p<0.001) in both the groups; on the other hand no statistically significant difference was found in the pre- and post-test scores between groups A and B (p=0.108). Five themes (1) advantages, (2) disadvantages of combining theory with practice, (3) time balance in teaching a skill, (4) training on skills, (5) skills-assessment, were found prevalent on thematic analysis of the FGDs. **Conclusion:** Students' ability to grasp the procedural skills was not significantly different when they acquire the cognitive skills in addition to the practical sessions. Students were more convinced to adopt combination of the two in the learning of procedural skills.

Keywords: Objective structured clinical examination, assessment, student learning, cognitive skills, skill centre

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INTRODUCTION

Skilfulness requires appropriate integration of knowledge, skills and attitude. It improves as you gain more experience. It has already been confirmed that rehearsing clinical skills before practicing on patients reduce the chances of untoward occurrences.[1] Cognitive skills are of paramount importance like making diagnosis, decision making etc.

Similarly clinical skills vary in their complexity, for example facile measurement of body mass index to challenging endovascular coiling. A doctor must be competent enough to carry out such procedure in this era of advancing public and peer expectations for professional values.[2]

To minimize the clinical errors, students should be given sufficient background knowledge of the requisite skills and should be provided with a learner centred environment with surplus opportunities to learn clinical skills. A novice can be trained on these skills to a specified level of competence in a learners centred environment in the clinical skills centre before practicing on patients.[3,4] In such centres, widely accepted simulation based learning provides safe climate to learn procedures. Many medical colleges have devised a set of basic clinical skills that all students have to master before graduation.[5] Skill programs focus more on practical procedures as compared with learning cognitive or communication skills.[6] Prominence given to technical intricacy, sacrificing the theory-based models, lack good reasons.[2] Nonetheless, putting in

more cognitive skills in surgical training has been proven to be efficient in terms of learning and use of funds.[7]

The leitmotif associated with the institution of Clinical Skills Centre based Module (CSM) for 4th year medical students in Rabigh Faculty of Medicine (RMC-KAU) is to train them on formal structured skills of history taking and clinical examination before they come across the real patients. Keeping in view the literature that advocates spending more time to achieve mastery of motor-skill, we should have to allocate more hours for learning domain of psychomotor skills.[8,9] But an incongruous focus on building cognition has been observed in this module. Some instructors have put forward their reservations about finding less time for practice and feedback in the cognitive domain of a *modus operandi*. This dilemma has arisen for the course designers in scribing the optimum proportion for both domains. In order to resolve this issue a study was carried out to fully comprehend the value of cognitive skills in a clinical skills oriented module.

By choosing a skill being taught in the CSM and training one group of students through combined course including cognitive and technical skills and the other though only technically, their scores on global rating scale may dictate to help solving the issue. Indeed the Objective Structured Assessment of Clinical Skills is an established measure of students' performance on technical skills.[10]

Global rating scales have been found to be more reliable and valid tool to assess the students' performance on skills as compare to the checklists.[10] Moreover qualitative data based on the perspectives of the students on training in different ways was collected and analysed in the context of their achievement in learning the skill. The results of this study will help to construct recommendations for changes in the module.

The main purpose of the sequential mixed methods study in RMC-KAU was to analyse quantitative results on performance of 2 groups of students on a clinical skill after training by two different models of instructions and follow up of selected students to deeply explore their perceptions. Firstly quantitative research was carried out. Randomly selected students were given pre-course cognitive learning in the form of short group discussion on error detection and forward planning and a lecture on problem solving and differential diagnosis. Participants of both groups were tested for their dexterity on clinical examination through global rating scale and their scores were compared.

Later qualitative exploration through focus group discussion added details to their perspectives about use of declared knowledge for improvement in procedural knowledge giving insight on useful educational strategy. Addition of teaching and learning cognitive skills related to the techniques has already been found to yield better understanding in a skill training course.[7] There is a considerable degree of variation in curriculum not only between different localities but also among institutions.[11] Each society has to tailor the curriculum according to the local perspectives.[12] This study will help guide the designers in making the outline of instructional plan for CSM for the undergraduates. Substantial information gathered from the study may delineate the importance of cognitive skills acquisition along with the desired psychomotor competencies in CSM. Finally students' reviews may help to define future directions.

The research question was: "What is the difference between the learning of two groups, one experiencing theory supported by practical sessions versus the other practicing a procedure alone and what are students' perspectives about the two approaches?"

The following terms were operationally defined: Learning: In this study the acquisition of skills taught by two different methods was assessed in terms of assessment through a global rating scale in a test given to both groups. Theory: cognitive skills foster fundamental conceptual capabilities that enhance the efficiency in acquisition of learning. In this study the intervention group (A) underwent a lecture and a small group discussion in order to give formal training on cognitive skills relevant to examination for a task in standardized patients. Practical sessions: During the learning sessions in the skill laboratory the students were given a chance to get training over the task in the simulated patients as well as on mannequins. The intervention group got training for only three sessions to rehearse the skill because their two sessions were replaced with the cognitive skills learning outside the laboratory. On the other side the control group was given the chance to practice for five times in the laboratory without any knowledge disquisition. Perspectives: It is opting for a situation or a matter for decision or consideration (or generated as a result of this option) that pertains to understanding, classifying, quantifying or collating the observations, to formulate a logical belief, classically comparing with something else. The students' perspectives about addition of theory to a clinical skill course were explored in this study.

The research paradigm for this study is pragmatic. Instead of the previously held position, here the knowledge claims arises out of actions, situations, and consequences. The data collection during the study would encompass any type of questions and could have been altered during the course of study. It can be applied in all contexts notably socio-political or historical.[13,14]

The study was carried out in the start of Clinical Skills Module. It is a sequential mixed method design. Implementation of the strands was done in two

phases; phase-1 a randomized controlled blinded trial and phase-2 to explore the students' perspectives.

During phase-1 a randomized control trial was done on two groups of students. Group-A was an intervention group and students in Group-B were considered as controls. Both groups underwent pre and post-course assessment through a global rating scale and their scores were compared.

In phase-2 the students' perspectives about the two ways of learning were collected through two Focus Group Discussions (FGD). Six students from group-A were selected purposively to sit and discuss. Similarly the same number of students from group-B was asked for their views on learning process in the second FGD. Both the FGD were supervised by a medical educationist who had the experience of running such FGDs in the past.

MATERIAL AND METHODS

Since we could not find a previous study similar to our research question, we calculated the sample size through power calculation given on the website: http://clincalc.com/Stats/SampleSize.aspx. After using an α value of 0.05, a β value of 0.2, and a δ value of 1.5 standard deviations, a sample size of 14 students per group resulted. Forty three medical students entering 4th year in Rabigh Faculty of Medicine participated in the study after approval from Institutional Review Board (IRB). Informed consent was taken by all the students. Anonymity of all the individual students was ensured throughout study. 1) Non-probability convenience sampling was used. 2) The selected participants were further divided randomly into two groups. The intervention group acquired cognitive skills at the expense of 2 less sessions as compared to 5 sessions on psychomotor training for the other group. (3) Finally the students with best communications skills were selected through purposive sampling for FGDs.

Psychomotor skill assessment with global rating scale on clinical examination were carried out before and after training by two separate teaching models by two consultants who were aware of the objectives of the study but blinded to the randomization of students. Two FGD, each with six students possessing good communication skills and from diverse backgrounds was carried out for one hour, on a round table in Clinical Skill Centre. Inquiry was provided to them during the discussion for example how they took cognition studded with the procedural skills and the degree to which they were comfortable with less repetition for the sake of learning theory. Each student was given equal opportunity of expression. A medical educationist from another medical college with wide experience on FGD ensured the observance of group dynamics. Being unknown to the students, this moderator provided the opportunity to express themselves fully and anonymously. The conversation was done in English and audio recorded. The accuracy in information reporting was assured through transcription by experts and by taking field notes. The analysis and interpretation of the students' views on the two different methods of information transfer led to the concocting of this phenomenon through phenomenological design.

The students would have been tempted to seek extra information on the subject steered by the pre-course test. In order to avoid this contamination we carried out this study in straight five sessions in a single day. Moreover the results of the participants in a previous module and after the end of current module were also compared with their performance in our study to verify the results. Moreover the pre and post-tests were marked independently by four separate examiners who were kept blind to the grouping and course attendance.

Quantitative data was analysed through SPSS version 21. Frequencies and percentages were calculated of all the responses in the Likert scale. Repeated Measures ANOVA test was carried out for the comparison of frequencies and percentages obtained through global rating scale between the two groups.

Qualitative data collected through FGD was based on identification of themes and subcategories. All the participants were provided with the transcriptions for verifications and corrections. QSR NVivo-11 was used to process the data analysis including verbatim transcription of the entire dialogue, coding and sorting the data and assigning these to the categories. The conclusion was drawn by creating links between the themes and was supported by the quotations to depict the expressions in the discussions.

- This study was carried out on the students of a single class who commenced 4th year in Rabigh Faculty of Medicine.
- Study participants were students of MBBS attending CSM in RMC-KAU only.
- Training and assessment was carried out for only one skill.
- Qualitative data was gathered from only those students who were selected to participate purposefully in FGD.
- Small sample size, training on only one technique, their performance as well as results on analysis, selected sample for FGD and the write-up are all that can limit our study to extrapolate it to the whole community.

Prior to carrying out the research and data collection, we applied to Institutional review Board (IRB) of RMC-KAU. The board evaluated the proposal to check any potential risks, such as psychological, social, economic or legal harm to the study participants. At the same time we submitted the form to take informed consent which can be downloaded from the RMC-KAU website. The

ownership of data and protection of the anonymity of the subjects was ensured. The students in FGDs were given pseudonyms like A, B, F and α, β, γ, ω, θ and ϵ to hide their identities in the transcription verbatim. Audio recordings will be kept for a period of five years after which they will be destroyed. We also took the permission from the Dean of the Medical College in order to gain access to the participants.

RESULTS

A total of 42 students completed both pre- and post-tests (n=44 students enrolled, response rate=95.45%). There were 22 students in the group A and 20 in group B. Mean age for all the participants was 20.67±0.979 (SD). The students' grades on the previous module assessment before entering the Clinical Skills Module as well as after completion of the whole CSM were comparable with mean of 83.07±5.293 and 83.52±6.764 with statistically no significant difference between the groups (p=0.66 & 0.134 for Previous module and CSM respectively). (Table-1 & 2) To determine which teaching methodology was superior in learning the psychomotor skills, we had to establish the learning increase in the skills at the end of the sessions. The study generated appropriate data, and multivariate ANOVA test was applied to reveal the difference between pre- and post- tests means. The average percent on the pre-test was 22.50 (±14.454) for group A and 28.00 (±15.338) in group B with no significant difference between the groups (p=0.239). For the post-test, mean percentage was 56.82 (±12.006) in group A and for group B, it was 64.80 (±15.518) for group B with no significance statistically between the groups (p=0.068). (Tables-1 & 2) The increase in learning the skill occurred in addition to students' prior skilfulness, as measured by the pre-test. It is obvious that improvement in the OSCE scores cannot be attributed to the students' experience prior to enrolment to this study. The difference between all the students as well as for each methodology was found significant revealing substantial improvement (i.e., acquiring skills) in the test scores. There was significant increase in mean group scores for both the groups in students from pre- test to post-test (p<0.001) but no statistically significant difference was found in the pre- and post- test scores between group A and B (p=0.108) (Figure-1)

Thematic analysis identified 5 prevalent themes: Advantages; disadvantages of combining theory with practice; time balance in teaching a skill; training on skills and skills-assessment. The themes and corresponding trends with comments verbatim are grouped together in the table-3. The frequencies of various trends appearing as a result of analysis of comments verbatim, that correspond to the various themes are shown in the Figures-2, 3 and 4.

Table-1: Descriptive data of the participants

		n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Age	1	22	20.86	.889	.190	20.47	21.26	19	22
	2	20	20.45	1.050	.235	19.96	20.94	19	23
	Total	42	20.67	.979	.151	20.36	20.97	19	23
Marks in previous module LAB	1	22	84.50	5.370	1.145	82.12	86.88	75	94
	2	20	81.50	4.861	1.087	79.22	83.78	70	90
	Total	42	83.07	5.293	.817	81.42	84.72	70	94
Marks in the whole CSM	1	22	85.00	5.606	1.195	82.51	87.49	76	95
	2	20	81.90	7.490	1.675	78.39	85.41	72	98
	Total	42	83.52	6.674	1.030	81.44	85.60	72	98
Pre-sessions %	1	22	22.50	14.454	3.082	16.09	28.91	10	55
	2	20	28.00	15.338	3.430	20.82	35.18	10	65
	Total	42	25.12	14.959	2.308	20.46	29.78	10	65
Post- Sessions %	1	22	56.82	12.006	2.560	51.49	62.14	40	80
	2	20	64.80	15.518	3.470	57.54	72.06	35	90
	Total	42	60.62	14.202	2.191	56.19	65.04	35	90

Table-2: One way ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	1.792	1	1.792	1.910	.175
	Within Groups	37.541	40	.939		
	Total	39.333	41			
Marks in previous module LAB	Between Groups	94.286	1	94.286	3.577	.066
	Within Groups	1054.500	40	26.362		
	Total	1148.786	41			
Marks in the whole CSM	Between Groups	100.676	1	100.676	2.333	.134
	Within Groups	1725.800	40	43.145		
	Total	1826.476	41			
Pre-sessions %	Between Groups	316.905	1	316.905	1.431	.239
	Within Groups	8857.500	40	221.438		
	Total	9174.405	41			
Post- Sessions %	Between Groups	667.432	1	667.432	3.512	.068
	Within Groups	7602.473	40	190.062		
	Total	8269.905	41			

Table-3: Comments of Students regarding the major themes and trends

1. Benefits for combining theory with practice:
    a. The explanation should create a desire to become skilled. Unfamiliar details or graphics triggers curiosity and help in recognition of the worth of acquiring the skill.
    b. Enhances respect for the skill and highlights the significance of capability to perform the skill
    a. history taking will depend wholly solely on knowledge and also physical examination
    b. If you do not teach me knowledge of a symptom, I will be lost on a task on history taking; it will be for nothing
    c. The real life experience on patients is different; its depends a lot on your knowledge
    d. Without back ground knowledge and concept I will forget the skills.
    e. it's really important to the examinations and the skills
    f. A person with knowledge of zoology can never be a good surgeon
2. Disadvantages of combining theory with practice
    a. OSCE focus on all my efforts on this performance so I am not going to the lectures, why should I waste my time
    b. I am not sure
    c. actually Lectures are only important for the written exams not OSCE
    d. Can an operation theatre assistant be a good surgeon after observing so many cases but without any cognitive skills?
3. Time balance in teaching a skill / What proportion of teaching should be over cognition during psychomotor training?
    a. Explanation (hearing)
        i. In OSCE I need just small and little amount of information, knowledge, but in real life, I'll need more equipped with more accurate knowledge
        ii. I need the knowledge for the physical examination, let's say
        iii. with my skill, I need the knowledge
        iv. It should be 10 % if assessment is only performance based
        v. If the OSCE is just PASS/FAIL I will definitely like to attend the lectures; I will study the knowledge and the skills in an equal way. 50% each
        vi. 30% knowledge 70 to skill
        vii. 40 % knowledge and 60 to skill
        viii. No marks no competition just Pass/fail I will go for 50% to both knowledge and skils
        ix. If OSCE has no questions related to theory it's better to get rid of knowledge and put every effort for the psychomotor building
        x. 35-40, 60-65%
        xi. Many will skip the lectures if assessment is only performance based
        xii. Should identify minimum qnd essential let say up to 10%; rest information in the form of lectures or small group discussion should be optional
        xiii. First I must be satisfied with acquiring the skill then I will go for optional lectures
        xiv. Putting extra time in lectures may harm my performance
        xv. it's better to have few lectures
        xvi. it should be a mix; cognition during demonstration; no extra lectures

    b. Demonstration (seeing)
        i. Sometimes I learn only if a good teacher do it in front of me
    c. Performance (doing) Insist on accuracy first, then speed (if speed is a factor), practice and to teach someone else
        i. Should take 100% with and without demonstration without extra time for explanation.
4. How to teach skills?
    a. Where demonstration of sills should be held?
        i. Simulation lab (Mannequins, Simulated patients) need to demonstrate each step slowly and clearly so that the learners can easily follow
        ii. Real patients in controlled situation (---in the field before graduation or after graduation, OSCE is for exam not to train us in real professional life, real life practice is different for OSCE in skills module,
    b. Practice:
        i. This is the heart of teaching a skill
        ii. We should be trained under supervision to correct on the spot.
        iii. There should be enough opportunities to try the skill to be confident
        iv. Teacher should train us according to our levels
    c. Application:
        i. There should be formative sessions with chance to get feedback
        ii. formative assessment in safe environment
        iii. learners should be taught the application of this skill in real life
    d. Theory:
        i. Placement of various didactic information transfer in Skills Module?
            - Before coming to Skill Module in Basic sciences: (there should be sequence) (it should be in parallel)
            - During the module as compulsory subject or voluntary lectures: (some part should be voluntarily and some part should be compulsory)
            - "I'll not come to the lectures if there is no attendance"
            - Without marks if some of the students want to take the lecture its good, it's up to them
            - Doctors are not only technicians; they must be knowledgeable
        ii. Applicability/ usefulness (to introduce the subject by giving some background about its usefulness and application)
        iii. Should be scenarios based/ living life learning experiences
        iv. Tutor should explain the skills in a simple, comprehensive, and tempting way
        v. We should not be trained for OSCE exam, but to make us better doctors
    e. Demonstration of skills
        i. Sometimes I learn only if a good teacher do it in front of me
5. Assessment in Clinical Skills Course:
    a. Skills without assessment:
        ii. We should be trained for how to approach a patient not for the exam
        iii. OSCE checklists should have some application knowledge questions
        iv. Even if I am performance oriented I will come to take the lectures
        v. Although content given in lectures was not assessed but still the information was useful
    b. Does our OSCE depicts real life situation
        i. No
        ii. Copycat can get more marks in OSCE but may be fail in practical life?
        iii. OSCE don't judge at the final step; real patient's managements, we do not develop holistic approach to the treat the patients

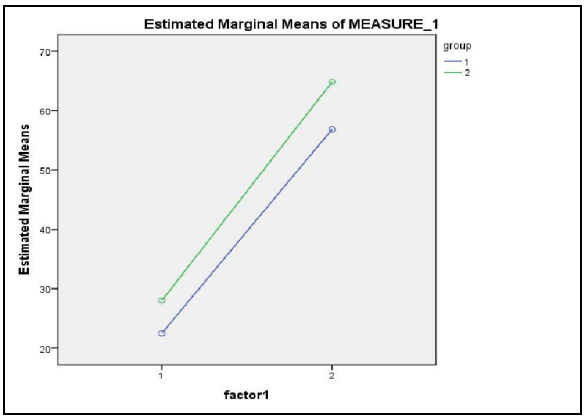

Figure-1: Estimated Marginal Means between Pre and Post-test scores in both groups

Figure-2: Word cloud showing the frequency of words in responses by students in FGDs

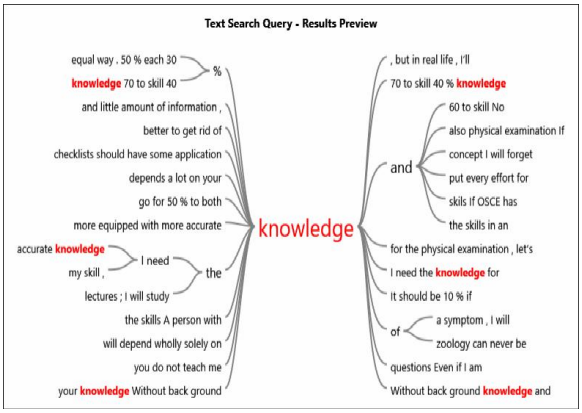

Figure-3: Word Tree showing the use of 'Knowledge' by the students

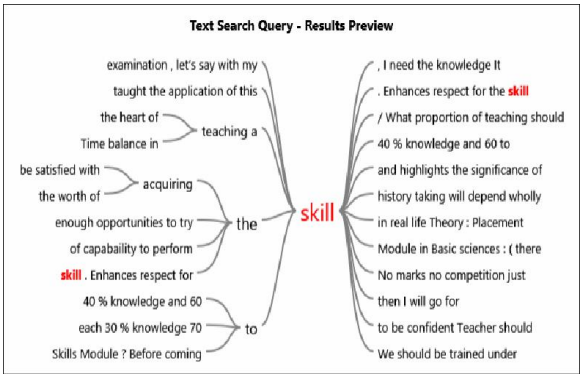

Figure-4: Word Tree showing the use of 'Skill' by the students

DISCUSSION

Clinical Skills are usually divided into psychomotor and cognitive. The former is mainly a manual skill such as carrying out physical examination and the latter is more concerned with skills of thinking, reasoning in order to diagnose or decide management.[15]

Acquisition of clinical skills such as examination techniques, detection of clinical signs, as well as their interpretations, are the essential requirements to establish the diagnosis at all levels of practice in Medicine. Lacking these skills may lead to missed, delayed or wrong diagnosis escalating morbidity and mortality. Sacrificing the clinical skills opportunities at the expense of acquiring cognitive skills based on investigations and advanced biomedical technologies can take away the clinician's clinical judgment rendering him incompetent. Although the literature lays stress to train the medical students to clinch the clinical signs through clinical methods but there are fundamental inadequacies of clinical teaching in the medical schools constantly culminating in passing graduates with defective skills of examination. Such deficiencies may be due to shortage of staff, increased students to staff ratio, inadequacies in the monitoring of students' learning or the teachers who think proficiency in the clinical methods do not reflect in higher abilities to detect clinical signs.[16] One of the solution to cover the staff: students ratio is to revise the curriculum to carry out Clinical Skills Module at community-based health set-ups.

The acquisition of clinical skills in community based health centres has been found to be not different from the students who were trained inside the hospitals.[17] When asked for a suitable location for Skills training one of the participant responded, "*Real patients in controlled situation ……. (maybe)…..in the field before graduation or after graduation"……., train us in real professional life, real life practice is different for OSCE in skills module.*"

Many of the instructors take the students to their offices to discuss case presentations replacing the important time for bed-side teaching verifying the data at the spot. Unfortunately the students are devoid of the opportunity to be meticulously observed and given formative feedback by this approach of teachers. Building cognitive skills through this presentation based approach may consume the precious point in time originally allocated for

teaching clinical skills.[18] In our study some students felt disadvantaged because they had fewer chances to practice the task as compared to their counterparts in the technical group. For example one of them said,

"OSCE focused on all my efforts on this performance so I am not going to the lectures, why should I waste my time."

Sometimes the instructors spend a considerable amount of time in explaining the skill leaving behind a very short time for the students to practice; transforming a skill session to a didactic lecture.[19] Combining the relevant cognitive skills to the procedures has been found to be efficacious in terms of learning and utilization of resources.[7] What proportion of the time should be allocated for transfer of the knowledge related to a skill was tried to be determined in our study. The students in both the groups stressed to go over the cognitive skills as mandatory in the learning of technical skill. However some of the students despite having performed similar to the other participants pointed out the need to rehearse the procedure to greater stretch. One of the suggestions from the participants was, *"It should be 10% if assessment is only performance based".* The institutions are adopting Skill-programs focusing more on practical procedures with reduced efforts on building cognitive skills.[6,19] On the other hand some institutions give emphasis on technical sophistication, reducing the time for cognitive skills.[7] It has been proven that time spent on a particular task is the most important factor in becoming proficient in a motor-skill. Paradoxically didactic teaching is still the focal point in most of the procedural skills.[7] Keeping in view there is a trend towards designing the courses stretched on practical with a reasonable time on initial didactic teaching. It has been observed that allocating more time for cognitive skills in surgical training leads to efficiency in terms of learning and use of funds.[7,8] If we design a skill program in such a way that attending the cognitive based lectures is optional, the performance oriented students may skip the classes. One of them said,

"First I must be satisfied with acquiring the skill then I will go for optional lectures".

"Many will skip the lectures if assessment is only performance based".

The addition of cognitive skills such as error detection, excogitating, problem-solving and feedback sessions were seen crucial for learning by the participants of our study; however many of them realized that while doing so there was some loss of opportunity for practicing the technical skill. However where should we put the balance between these two different domains in coaching a technical skill has yet to be pursued.

What proportion should cognitive skills take in teaching a skill oriented course? The literature advocates spending more time to achieve mastery of motor-skill.[8,9] Although any skill course that integrates cognitive and technical skills training leads to better results but an incongruous focus on building cognition has been observed in the skills module (CSM). Whether this dual course is overloading our students and how they feel about it? In order to seek a possible and meaningful conclusion we carried out this study where the students suggested as:

"it should be a mix; cognition during demonstration; no extra lectures".

Performance ……" should take 100% with and without demonstration without extra time for explanation".

Efforts to include Cognitive skills learning sessions in the technical training courses has shown to hasten the grasping of skills and performance by increasing the awareness of application of the skill being taught as well as reducing the load on the students necessary to become competent both cognitively and technically.[8,9,20] Our results supports the work by these researchers by observing the similar great improvement in their level of technical skill. However the students in the Cognitive group were more satisfied to get training on developing the ability to recognize errors through didactic teaching. One of them expressed his feeling as given below:

"The explanation should create a desire to become skilled. Unfamiliar details or graphics trigger curiosity and help in recognition of the worth of acquiring the skill."

In our case OSCE could not detect any difference between these two groups. Indeed there is a need to devise a standardized measure to examine the students more than only their practical skills. Therefore assessment in the technical course should be directed to find out competent students rather than highest achievers. For example a student said,

"Sometimes least engaged class fellows are the highest achievers, it is because they know how to prepare for examination."

"Copycat can get more marks in OSCE but may fail in practical life?"

Revising the assessment in a way to include cognitive skills will allow the assessment of students who show deductive reasoning, error correction and problem-solving techniques. Such modifications will enhance to filter the students who will behave as close as in their practical life. The strategy to train the students over checklist to cover all the steps in clinical methods and performing in the

OSCE in the similar way will take away the 'curiosity'; essential feature in discovery learning.

CONCLUSIONS

Although technical skills require practice to develop but the interaction between acquiring cognitive skills in parallel to the skill-training program has been preferred by the students who participated in our study. The focus on cognitive skills has not adversely affected the acquisition of psychomotor skills. Clearly, further work to include assessment on cognitive skills in addition to OSCE is worth exploring.

AUTHOR'S CONTRIBUTION

The study was conceived and designed by MIS. The data collection was done by MIS, AS and FI. Analysis and data interpretation was be done by IUR and MIS. IUR and FI revised the manuscript and final approval was done by MIS. IQ and AS provided the resources. Literature was researched by MIS and FI whereas technical and logistic support was provided by AS.

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